

Math 1060 Final Exam Form A - Fall Semester 2008

Name _____

Instructor _____

Student ID _____

ID Verification _____

This exam has three parts: Carefully read the instructions for each part. All problems are of equal point value. The exam is closed book with no notes or formula sheets allowed. When the directions specify "exact value", a calculator should not be used.

Part I
Multiple Choice

Circle the best response. Solve all problems in this section. No partial credit will be given.

Use a calculator to find the acute angle α (to the nearest tenth of a degree) that satisfies the equation.

1) $\tan(\alpha) = 2.0341315$

A) 26.2°

B) 63.8°

C) 116.2°

D) 243.8°

Find the exact value .

2) $\cot 45^\circ$

A) 1

B) $\frac{\sqrt{2}}{2}$

C) $\sqrt{2}$

D) $\frac{2\sqrt{3}}{3}$

Find the length of the arc intercepted by the given central angle α in a circle of radius r .

3) $\alpha = \frac{3\pi}{4}$, $r = 93.3$ m

A) 124.4 m

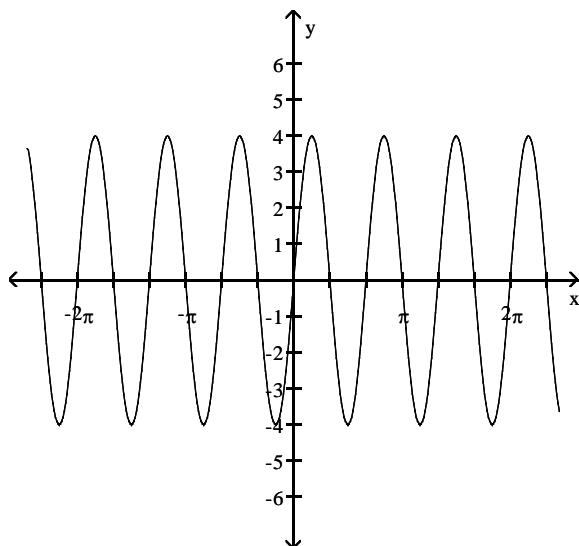
B) 70 m

C) 390.8 m

D) 219.8 m

Find an equation for the graph.

4)



A) $y = 3 \sin\left(\frac{1}{4}x\right)$

B) $y = 4 \sin\left(\frac{1}{3}x\right)$

C) $y = 3 \sin(4x)$

D) $y = 4 \sin(3x)$

Solve the problem.

5) Find $\sin(\alpha)$, given that $\cos(\alpha) = \frac{2}{3}$ and α is in quadrant IV.

A) $-\sqrt{5}$

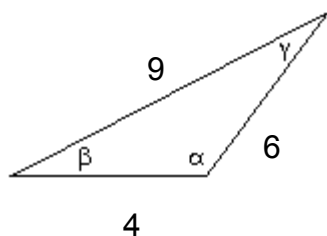
B) $-\frac{3}{2}$

C) $-\frac{\sqrt{5}}{2}$

D) $-\frac{\sqrt{5}}{3}$

Find the area of the triangle. If necessary, round the answer to two decimal places.

6)



A) 44.16

B) 3.1

C) 192.48

D) 9.56

Find all real numbers in the interval $[0, 2\pi]$ that satisfy the equation.

7) $2\cos(2x) = \sqrt{3}$

A) $\frac{\pi}{3}, \frac{5\pi}{3}$

B) $\frac{\pi}{6}, \frac{11\pi}{6}$

C) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

D) $\frac{\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{23\pi}{12}$

Solve the problem.

8) Which of the following vectors is orthogonal to $\langle 20, -8 \rangle$?

A) $\langle 20, 4 \rangle$

B) $\langle -10, -25 \rangle$

C) $\langle 15, -6 \rangle$

D) $\langle 4, 3 \rangle$

Simplify the expression.

9) $\frac{\cos(-x)}{\tan(-x)} - \sin x$

A) $\csc x$

B) $-\csc x$

C) $\sec x$

D) $-\sec x$

Find the dot product of the given vectors.

10) $\mathbf{u} = \langle 11, 5 \rangle$, $\mathbf{v} = \langle 15, -14 \rangle$; Find $\mathbf{u} \cdot \mathbf{v}$.

A) 95

B) 165

C) 235

D) 70

Find the equation for the curve in its final position.

11) The graph $y = \sin(x)$ is shifted a distance of $\pi/2$ to the right, stretched by a factor of 5, and then is translated 3 units downward.

A) $y = 5 \sin \left(x + \frac{\pi}{2} \right) + 3$

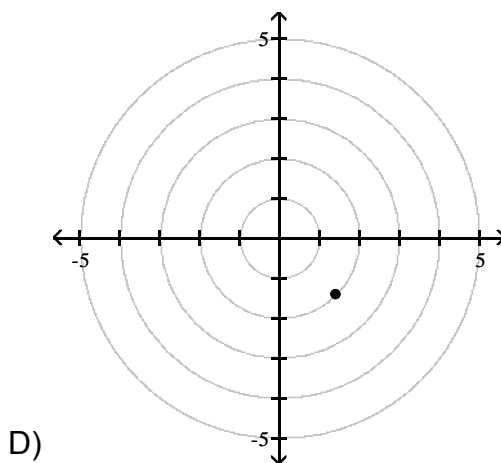
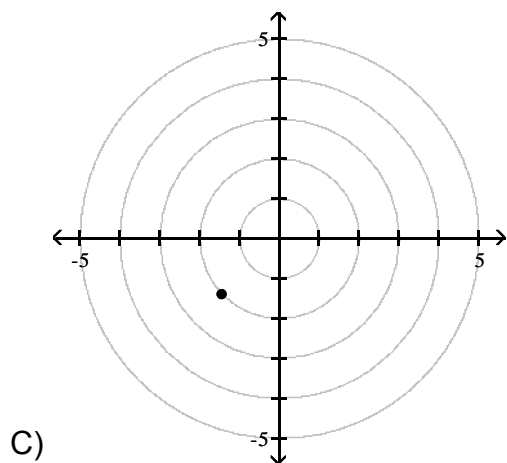
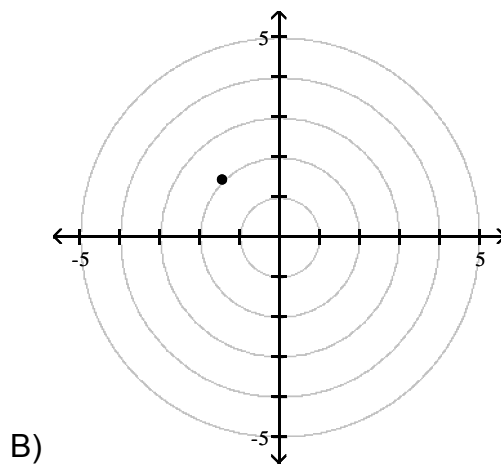
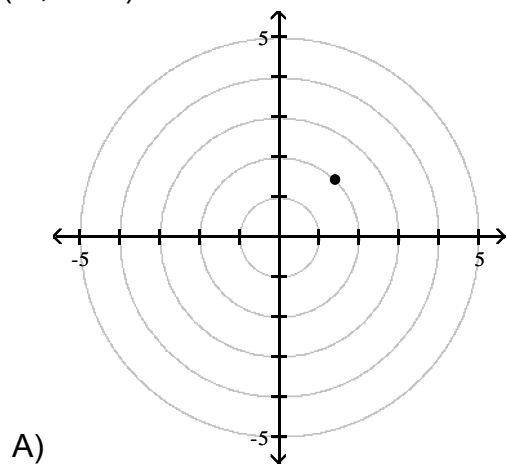
B) $y = 5 \sin \left(x - \frac{\pi}{2} \right) - 15$

C) $y = 5 \sin \left(x - \frac{\pi}{2} \right) - 3$

D) $y = 5 \sin \left(x - \frac{\pi}{2} \right) + 3$

Plot the point whose polar coordinates are given.

12) $(-2, 3\pi/4)$



Part II

Work all the problems in this section. Show detailed solutions. Full credit will be given only if appropriate work is shown.

Solve the triangle. If there is more than one triangle with the given parts, give both solutions. Round your answers to two decimals.

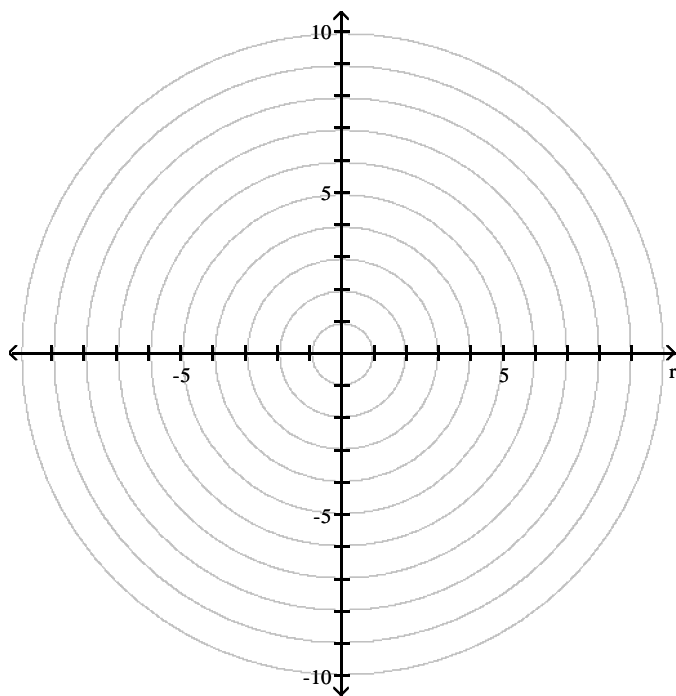
13) $\beta = 16.86^\circ$
 $b = 10.00$
 $a = 11.49$

Solve the equation. Find all solutions. Leave your answers in radians.

14) $\sin(2\theta) + \sin \theta = 0$

Identify and graph the polar equation. Give the coordinates, (r, θ) of at least four points.

15) $r = 4 + 4 \sin \theta$



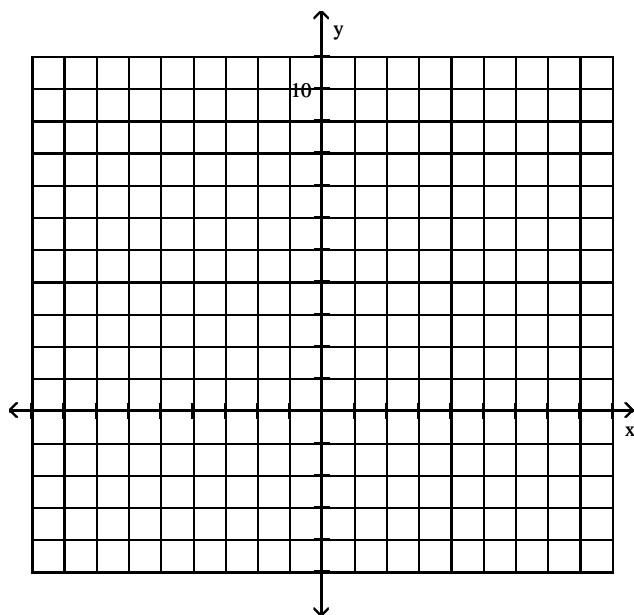
Convert the complex number to trigonometric form, using degree measure for the argument . Then compute z^4 .

16)

) $z = 5\sqrt{3} - 5i$

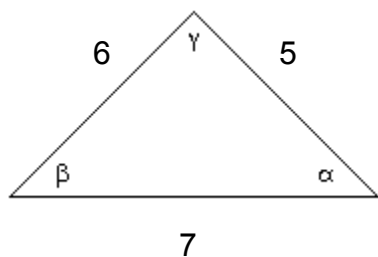
Graph the curve whose parametric equations are given. Label at least four points.

17) $x = 2t - 1$, $y = t^2 + 2$; $-2 \leq t \leq 3$



Solve the triangle. Round your answers to one decimal place.

18)



Find the smallest positive angle between the given vectors to the nearest tenth of a degree.

19) $\mathbf{v} = \langle -6, -7 \rangle$, $\mathbf{w} = \langle 5, 6 \rangle$

Find $\cos(\alpha + \beta)$.

20) $\cos \alpha = \frac{1}{3}$ and $\sin \beta = \frac{1}{4}$, where $0 < \alpha < \frac{\pi}{2}$ and $\frac{\pi}{2} < \beta < \pi$. Leave your answer exact.

Part III

Work four (4) problems in this section. Cross out the four (4) problems that you do not want graded. Show detailed solutions. Full credit will be given only if appropriate work is shown.

Establish the Identity.

$$21) \frac{\sin x}{1 - \cos x} + \frac{\sin x}{1 + \cos x} = 2 \csc x$$

The distance, d (in meters), that an object travels in t (seconds) is given. What is the maximum displacement from its resting position, the time required for one oscillation (period), and the frequency? Leave your answers exact.

$$22) d = 2 \sin(5t) \text{ meters}$$

Maximum Displacement:

Period:

Frequency:

Find a rectangular equation for the plane curve defined by the parametric equations. State the domain and the range of the rectangular equation.

23) $x = \sin t, y = 3 \cos t$

domain:

range:

Solve the problem.

- 24) An airplane flies on a compass heading of 90° at 290 mph. The wind affecting the plane is blowing from 303° at 40.0 mph. What is the true course and ground speed of the airplane? Round results to the nearest tenth.

Given the complex numbers z and w , find zw . Leave your answer in trigonometric form where the argument is in radians.

25) $z = 2 + 2i$, $w = \sqrt{3} - i$

Solve the problem.

- 26) Yosemite Falls in California consists of three sections: Upper Yosemite Fall (by itself one of the ten highest waterfalls in the world), the Middle Cascade, and Lower Yosemite Fall. From a footbridge across the creek 2500 feet from the falls, the angles of elevation to the top and bottom of Upper Yosemite Fall are 45.74° and 24.42° , respectively. How high is Upper Yosemite Fall? Round your answers to the whole foot.

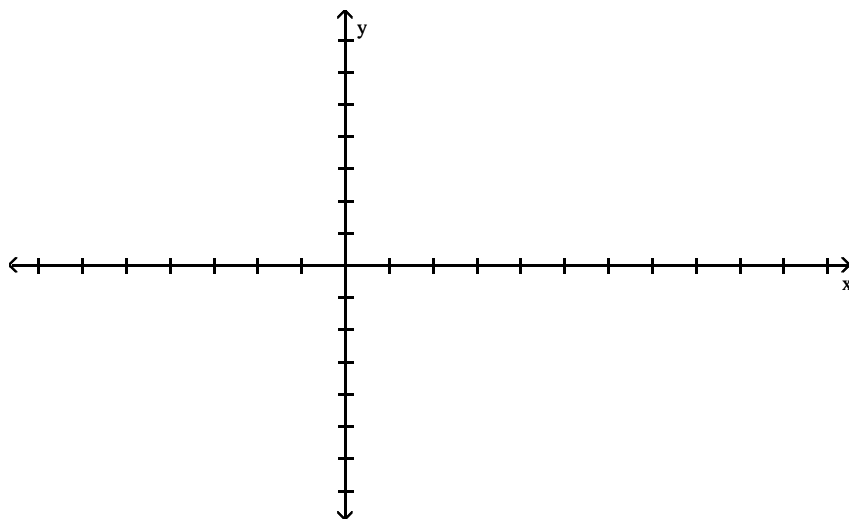
Graph the function, showing at least one period. Identify the amplitude, period, and phase shift, if applicable. Label the x and y axes with the appropriate scale marks.

27) $y = 3 \cos\left(2x + \frac{\pi}{2}\right)$

Amplitude:

Period:

Phase shift:



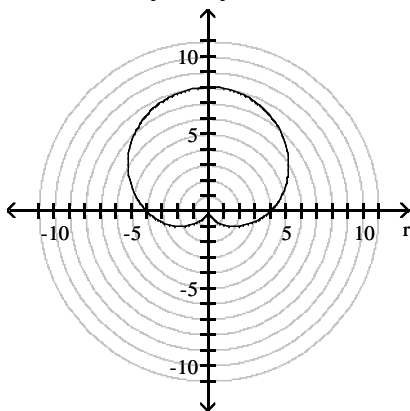
Solve the problem.

- 28) At a golf course the distance from the tee to the hole is 479 yards. A famous golfer tees off and slices his drive 10° to the right of the line from tee to the hole. If the drive went 288 yards, how many yards will the golfer's second shot have to be to reach the hole?
Round your answer to one decimal place.

Answer Key

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- 1) B
- 2) A
- 3) D
- 4) D
- 5) D
- 6) D
- 7) D
- 8) B
- 9) B
- 10) C
- 11) C
- 12) D
- 13) $\alpha = 19.47^\circ$, $\gamma = 143.67^\circ$, $c = 20.43$;
 $\alpha' = 160.53^\circ$, $\gamma' = 2.61^\circ$, $c' = 1.57$
- 14) $\frac{2\pi}{3} + 2k\pi$, $k\pi$, $\frac{4\pi}{3} + 2k\pi$
- 15) Cardioid
 Points may vary

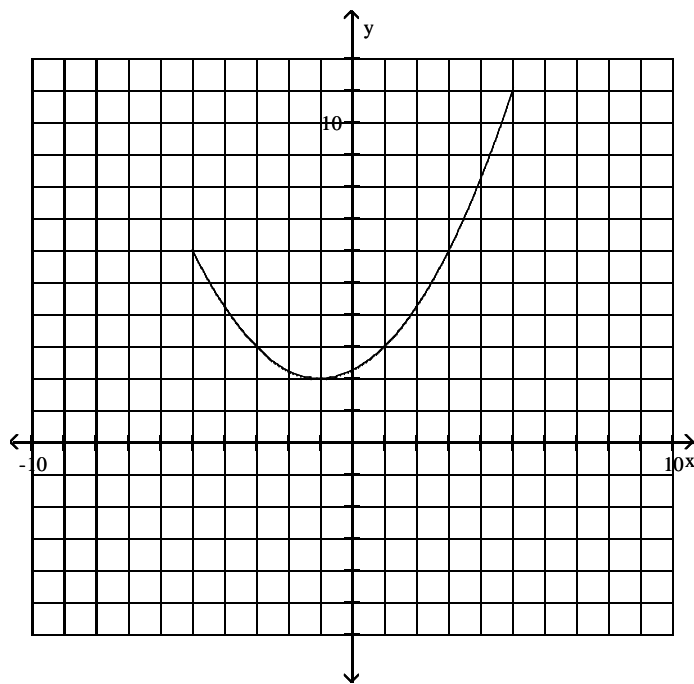


- 16) $10^4(\cos(240^\circ) + i \sin(240^\circ))$

Answer Key

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17) Points may vary



18) $\alpha = 57.1^\circ$, $\beta = 44.4^\circ$, $\gamma = 78.5^\circ$

19) 179.2°

20) $-\frac{\sqrt{15} + 2\sqrt{2}}{12}$

21) answers may vary

22) Maximum displacement = 2 meters

$$\text{Period} = \frac{2}{5} \pi \text{ seconds}$$

$$\text{Frequency} = \frac{5}{2\pi} \text{ oscillations/second}$$

23) $9x^2 + y^2 = 9$

24) 94° , 324 mph

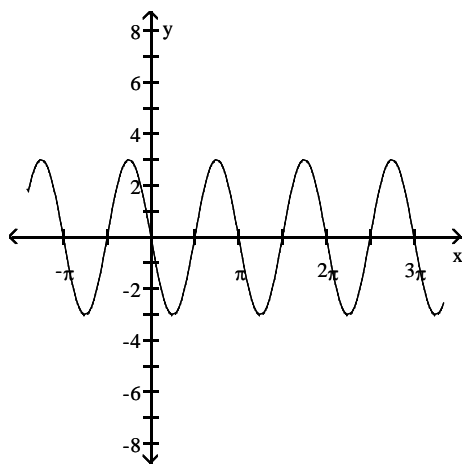
25) $4\sqrt{2}(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12})$

26) 1430 ft

Answer Key

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27)



28) 201.7 yd